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.	not available for any reference period
..	not available for a specific reference period
...	not applicable
0	true zero or a value rounded to zero
0^s	value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
^{p}	preliminary
^{r}	revised
x	suppressed to meet the confidentiality requirements of the *Statistics Act*
^{E}	use with caution
F	too unreliable to be published
*	significantly different from reference category ($p < 0.05$)

Acute myocardial infarction hospitalization and treatment: Areas with a high percentage of First Nations identity residents

by Helen Ke Wei-Randall, Mélanie Josée Davidson, Jing Jin, Sushma Mathur and Lisa Oliver

Abstract

Background

Deaths from acute myocardial infarction (AMI) are higher among First Nations people than among non-Aboriginal Canadians. Hospital interventions often involve revascularization: percutaneous coronary intervention (PCI) and coronary artery bypass grafting (CABG). Because patients' ethnicity is not reported consistently in hospital records, no national information is available about AMI hospitalizations or the use of such procedures among First Nations people.

Data and methods

This study uses an area-based approach to identify AMI hospital patients who live in Dissemination Areas with relatively high percentages of First Nations residents. Within the AMI patient cohort, procedures received during the hospital admission were identified.

Results

The age-standardized hospitalized AMI event rates were 276.8 per 100,000 population for residents of high-percentage First Nations identity areas and 157.1 per 100,000 population for residents of low-percentage Aboriginal identity areas. AMI patients from high-percentage First Nations identity areas were less likely than patients from low-percentage Aboriginal identity areas to undergo revascularization, a difference largely driven by a lower PCI procedure rate. The lower PCI procedure rate persisted when controlling for age, sex, rural/urban residence, and the patient's condition at admission.

Interpretation

Residents of high-percentage First Nations identity areas were more likely to be hospitalized for AMI, but were less likely to undergo revascularization.

Keywords

Aboriginal health, coronary artery bypass, heart diseases, hospital records, myocardial ischemia, percutaneous coronary intervention, revascularization, small area variations

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Deaths from acute myocardial infarction (AMI), commonly known as a heart attack, are 25% higher among First Nations men and 55% higher among First Nations women than among non-Aboriginal Canadians.[1,2] Appropriate and timely health care after an AMI can reduce mortality and improve a survivor's quality of life.[3-7] Hospital treatment interventions for AMI focus on restoring blood flow to the heart by removing or bypassing blockages. This can be achieved through pharmaceutical interventions to dissolve blood clots, and through revascularization: percutaneous coronary intervention (PCI) and coronary artery bypass grafting (CABG).

PCI, a non-surgical procedure, involves inserting and inflating a balloon to open a blocked artery. CABG is a surgical procedure performed on patients with considerable narrowing or blockage of multiple heart arteries; arteries or veins from other parts of the body are grafted to bypass blockages in arteries to the heart. PCI is more common than CABG because it is less invasive and requires a shorter recovery time. PCI, however, can be time-sensitive, and in some cases, should be performed within few hours of admission to hospital.[8-11] Coronary angiography is a diagnostic procedure that gives a picture of the heart's arteries to determine the extent of coronary heart disease and assess what type of treatment is appropriate.

Because hospital records do not consistently contain Aboriginal identifiers, no national information is available about AMI hospitalizations or the use of cardiac procedures for First Nations people. This report employs an area-based methodology ("geozones"[12]) to study hospitalized AMI patients who live in areas with relatively high percentages of First Nations identity residents. The

analysis fills two information gaps. First, hospitalized AMI event rates are calculated to estimate the occurrence of AMI in high-percentage First Nations identity areas. Second, differences in diagnostic (coronary angiography) and revascularization procedure use (PCI and CABG) between areas with a high percentage of First Nations identity residents and areas with a lower percentage of Aboriginal residents are examined.

Data and methods

Data on hospital admissions for AMI and on procedures used to treat AMI were obtained from the Canadian Institute for Health Information (CIHI) Discharge Abstract Database (DAD) and the National Ambulatory Care Reporting System (NACRS), and from the Alberta Ambulatory Care Reporting System of Alberta Health and Wellness. Since 2010/2011, Alberta has submitted all ambulatory care visits to NACRS; previously, ambulatory care visits were sourced from the Alberta Ambulatory Care Reporting System.

Because the DAD does not consistently contain information on Aboriginal identity, an area-based methodology was used to identify patients from areas with a high percentage of First Nations identity residents as reported in the 2006 Census, and from areas with a low percentage of Aboriginal identity residents. Other studies have used this "geozones" approach to examine acute care hospitalizations and premature mortality in areas with a high percentage of Aboriginal identity residents.[12-14]

Consistent with the earlier studies, and given that complete postal code information was not available for patients from Quebec, *areas with a high percentage of First Nations identity residents* were defined as Dissemination Areas outside Quebec, where at least 33% of the 2006 Census population self-identified as an Aboriginal person (North American Indian/First Nations, Inuit or Métis) and the predominant identity reported was North American Indian (First Nations). Based on this definition, in 2006, almost half (48%) of the First Nations population lived in areas with a high percentage of First Nations identity residents. (Areas where the population predominantly self-identified as Inuit or Métis were excluded from this analysis.) *Areas with a low percentage of Aboriginal identity residents* were defined as Dissemination Areas outside Quebec where fewer than 33% of the 2006 Census population self-identified as an Aboriginal person.

The Statistics Canada Postal Code Conversion File (PCCF+) was used to match patient postal codes to Census Dissemination Areas.[15,16] Quebec data were excluded because the complete 6-digit postal codes are not available. As well, another 13% of records had incomplete, missing or invalid postal codes and could not be included in this analysis.

Given the small number of AMI events in areas with a high percentage of First Nations identity residents, data for fiscal years 2004/2005 to 2010/2011 were pooled.

According to the International Classification of Diseases (ICD-10-CA), myocardial infarction is acute when it has a stated duration of four weeks (28 days) or less from onset. Therefore, a 28-day period was used in this study to define a new AMI event. (Appendix A contains the ICD codes used to identify an AMI event.) A patient admitted for two AMIs within 28 days was counted as one AMI event, and a single person may have had more than one AMI event during the study period.[17] People who had an AMI, but were not admitted to an acute care hospital, were not included in the AMI event rate calculation.

Within the AMI patient cohort, coronary angiography, PCI and CABG that were received during the hospital admission were identified using the Canadian Classification of Health Intervention codes (Appendix A). These procedures may have been performed in hospital, in same-day surgery facilities, or in catheterization laboratories.[17] AMI patients who died during their hospital stay were included in the calculation of procedure rates.

A multiple logistic regression model was used to risk-adjust PCI procedure rates by taking into account factors that may influence treatment decisions. The model adjusted for age, sex, rural/remote versus urban residence, and the presence of at least one comorbidity (shock, heart failure, acute lung edema, cardiac dysrhythmia, diabetes, renal disease, cancer, chronic obstructive pulmonary disease, hypertension, peripheral vascular disease, cerebrovascular disease, and AMI in the preceding year).[18,19] These comorbidities were included if the diagnosis types were recorded as pre-admit comorbidities (a condition that existed before admission and satisfied the requirements for determining comorbidity) or a service transfer diagnosis (a diagnosis code associated with the first/second/third service transfer) according to ICD-10-CA definitions. Additionally, secondary diagnoses of diabetes were included in the "diabetes" category. Data on other factors that may influence treatment options, such as time from the event to receiving the procedure and the severity of the heart attack, were not available from the hospital records.[10,19-21]

Rates of hospitalized AMI events were calculated per 100,000 population aged 20 or older. Procedure use (PCI and CABG) is expressed as a percentage of AMI events. The denominators used to calculate rates were from 2006 Dissemination Area Census counts; the 2006 population was multiplied by seven to correspond to the hospitalization data (2004/2005 to 2010/2011). Hospitalized AMI event rates were directly age-standardized to the 2006 Census First Nations identity population. Cardiac procedure rates were age-standardized to the age distribution of the hospitalized AMI patient population from areas with a high percentage of First Nations identity residents, using the direct method. Rate ratios and rate differences for patients from high-percentage First Nations identity areas, compared with patients from low-percentage Aboriginal identity areas, were calculated overall and by sex and age group. Confidence intervals for crude rates and age-standardized rates are based on a Bernoulli distribution. A statistical significance test was applied to determine if rates of hospitalized AMI event, cardiac procedure use, and risk-adjusted PCI procedure for patients from high-percentage

First Nations identity areas differed significantly from rates for patients from low-percentage Aboriginal identity areas ($p<0.05$). All statistical analyses were performed using SAS version 9.2.

Results

Hospitalized AMI event rates

For the period from April 2004 to March 2011, a total of 6,560 hospitalized AMI events were recorded for residents of high-percentage First Nations identity areas, compared with 347,128 AMI events for residents of low-percentage Aboriginal identity areas. The age-standardized hospitalized AMI event rates were 276.8 per 100,000 population and 157.1 per 100,000 population, respectively, or 76% higher in high-percentage First Nations identity areas ($p<0.05$) (Table 1).

In all areas, regardless of the Aboriginal identity percentage, men accounted for nearly two-thirds of AMI events, and were more than twice as likely as women to be hospitalized for an AMI.

The median age of AMI patients from high-percentage First Nations identity areas was 64, compared with 71 for AMI patients from low-percentage Aboriginal identity areas.

Coronary angiography

The age-standardized angiography rate for AMI patients from high-percentage First Nations identity areas was lower than that for patients from low-percentage Aboriginal identity areas: 51% versus 58% (rate ratio of 0.9; $p<0.05$) (Figure 1, Table 2).

Revascularization procedures

AMI patients from high-percentage First Nations identity areas were less likely than patients from low-percentage Aboriginal identity areas to undergo revascularization (PCI and CABG combined): 40% versus 47% ($p<0.05$) (Table 2). The difference was largely driven by the relatively small percentage of AMI patients from high-percentage First Nations areas who underwent PCI (31%), compared with low-percentage Aboriginal identity areas (38%) ($p<0.05$). At 9%, the percentage of AMI patients treated using CABG was similar for both groups (Figure 1).

Factors affecting PCI procedure

Factors that can influence whether an AMI patient will be treated using PCI or CABG include age, sex, and disease complexity.[18,19,22-24]

AMI patients from high-percentage First Nations identity areas were more likely than those from low-percentage Aboriginal identity areas to have at least one comorbid condition (55% versus 46%; $p<0.05$) (Table 3). The most common co-morbid conditions among AMI patients from high-percentage First Nations identity areas were diabetes (39%) and heart failure (11%). Diabetes, in particular, was more likely to be a comorbid condition among AMI patients from high-percentage First Nations identity areas than among those from low-percentage Aboriginal identity areas (39% versus 27%; $p<0.05$).

When age, sex, and the presence of at least one co-morbidity were taken into account in a multiple regression model, the odds of receiving a PCI procedure were 26.9% lower for patients from high-percentage First Nations identity areas than for AMI patients from low-percentage Aboriginal identity areas ($p<0.05$) (data not shown). Because AMI patients from high-percentage First Nations identity areas are less likely to live near or to be admitted to hospitals with on-site cardiac revascularization capacity, and are more likely to live in rural and remote areas, the logistic

Table 1
Acute myocardial infarction (AMI) events, rates, rate differences and rate ratios, by sex, age group and Aboriginal identity group in Dissemination Area, population aged 20 or older, Canada excluding Quebec, 2004/2005 to 2010/2011

	High-percentage First Nations identity areas				Low-percentage Aboriginal identity areas					
	Number of AMI events	Rate per 100,000	95% confidence interval		Number of AMI events	Rate per 100,000	95% confidence interval		Rate difference	Rate ratio
			from	to			from	to		
Total										
Crude	6,560	346.6	338.2	355.0	347,128	279.8	278.9	280.7	66.8	1.2
Age-standardized†	...	276.8	270.0	283.6	...	157.1	156.5	157.7	119.7	1.8
Sex										
Men	4,306	375.9	364.6	387.2	219,159	229.4	228.4	230.4	146.5	1.6
Women	2,254	176.7	169.1	184.3	127,969	90.6	90.0	91.2	86.1	1.9
Age group (years)										
20 to 34	57	8.9	6.6	11.3	1,832	5.8	5.5	6.0	3.1	1.5
35 to 44	380	89.1	80.2	98.1	12,736	50.3	49.4	51.1	38.8	1.8
45 to 54	1,217	331.7	313.1	350.4	45,490	176.6	175.0	178.2	155.1	1.9
55 to 64	1,636	686.1	652.9	719.4	68,106	363.3	360.5	366.0	322.8	1.9
65 to 74	1,551	1,143.2	1,086.3	1,200.1	73,536	625.6	621.0	630.1	517.6	1.8
75 or older	1,719	1,970.9	1,877.7	2,064.1	145,428	1,358.9	1,352.0	1,365.9	612.0	1.5

† standardized to age distribution of population that identified as First Nations in 2006 Census
... not applicable
Sources: 2004/2005 to 2010/2011Discharge Abstract Database, Canadian Institute for Health Information, 2006 Census, Statistics Canada.

Table 2
Numbers, percentages, rate differences and rate ratios of cardiac procedures for acute myocardial infarction (AMI) hospital patients, by procedure, sex, age group and Aboriginal identity group in Dissemination Area, population aged 20 or older, Canada excluding Quebec, 2004/2005 to 2010/2011

	High-percentage First Nations identity areas				Low-percentage Aboriginal identity areas					
			95% confidence interval				95% confidence interval			
Procedure, sex and age group	Number of procedures	Percent of AMI patients	from	to	Number of procedures	Percent of AMI patients	from	to	Rate difference	Rate ratio
Coronary angiography										
Total										
Crude	3,352	51.1	49.4	52.9	178,137	51.4	51.2	51.7	-0.3	1.0
Age-standardized†	...	51.1	49.9	52.3	...	58.1	57.9	58.3	-7.0	0.9
Sex†										
Men	2,393	53.8	52.4	55.2	125,504	60.1	59.9	60.3	-6.3	0.9
Women	959	46.0	43.9	48.1	52,633	54.5	54.2	54.8	-8.5	0.8
Age group (years)										
20 to 44	310	70.9	63.0	78.8	11,047	76.0	74.6	77.5	-5.1	0.9
45 to 54	782	64.3	59.8	68.8	34,390	75.8	75.0	76.6	-11.5	0.8
55 to 64	968	59.2	55.5	63.0	48,123	70.8	70.2	71.4	-11.6	0.8
65 to 74	791	51.1	47.5	54.6	42,906	58.5	57.9	59.0	-7.4	0.9
75 or older	501	29.1	26.6	31.7	41,671	28.7	28.4	29.0	0.4	1.0
Revascularization (PCI and CABG combined)										
Total										
Crude	2,593	39.6	38.0	41.1	141,837	40.9	40.7	41.1	-1.3	1.0
Age-standardized†	...	39.6	38.5	40.7	...	46.8	46.6	47.0	-7.2	0.9
Sex†										
Men	1,945	43.7	42.3	45.1	104,191	50.1	49.9	50.3	-6.4	0.9
Women	648	31.1	29.1	33.1	37,646	38.8	38.5	39.1	-7.7	0.8
Age group (years)										
20 to 44	227	51.9	45.2	58.7	8,360	57.5	56.3	58.8	-5.6	0.9
45 to 54	623	51.2	47.2	55.3	28,541	62.9	62.2	63.6	-11.7	0.8
55 to 64	759	46.5	43.1	49.8	40,182	59.1	58.5	59.7	-12.6	0.8
65 to 74	615	39.7	36.6	42.8	34,080	46.4	45.9	46.9	-6.7	0.9
75 or older	369	21.5	19.3	23.7	30,674	21.1	20.9	21.4	0.4	1.0
Percutaneous coronary intervention (PCI)										
Total										
Crude	2,012	30.7	29.4	32.0	114,374	33.0	32.8	33.2	-2.3	0.9
Age-standardized†	...	30.7	29.6	31.8	...	38.1	37.9	38.3	-7.4	0.8
Sex†										
Men	1,488	33.3	31.9	34.7	82,978	40.1	39.9	40.3	-6.8	0.8
Women	524	25.2	23.3	27.1	31,396	32.8	32.5	33.1	-7.6	0.8
Age group (years)										
20 to 44	204	46.7	40.3	53.1	7,664	52.8	51.6	53.9	-6.1	0.9
45 to 54	501	41.2	37.6	44.8	24,974	55.0	54.4	55.7	-13.8	0.7
55 to 64	580	35.5	32.6	38.4	32,377	47.6	47.1	48.2	-12.1	0.7
65 to 74	437	28.2	25.6	30.9	25,417	34.6	34.2	35.1	-6.4	0.8
75 or older	290	16.9	14.9	18.8	23,942	16.5	16.3	16.7	0.4	1.1
Coronary artery bypass graft (CABG)										
Total										
Crude	612	9.3	8.6	10.1	29,136	8.4	8.3	8.5	0.9	1.1
Age-standardized†	...	9.3	8.6	10.0	...	9.2	9.1	9.3	0.1	1.0
Sex†										
Men	480	10.9	10.0	11.8	22,513	10.6	10.5	10.7	0.3	1.0
Women	132	6.3	5.3	7.3	6,623	6.4	6.2	6.6	-0.1	1.0
Age group (years)										
20 to 44	24	5.5	3.3	7.7	779	5.4	5.0	5.7	0.1	1.0
45 to 54	126	10.4	8.6	12.2	3,850	8.5	8.2	8.8	1.9	1.3
55 to 64	191	11.7	10.0	13.3	8,322	12.2	12.0	12.5	-0.5	1.0
65 to 74	190	12.3	10.5	14.0	9,159	12.5	12.2	12.7	-0.2	1.0
75 or older	81	4.7	3.7	5.7	7,026	4.8	4.7	5.0	-0.1	1.0

† standardized to age distribution of high-percentage First Nations identity AMI patient population
... not applicable
Sources: 2004/2005 to 2010/2011 Discharge Abstract Database and National Ambulatory Care Reporting System, Canadian Institute for Health Information; 2004/2005 to 2009/2010 Alberta Ambulatory Care Database, Alberta Health and Wellness; 2006 Census, Statistics Canada.

regression models were stratified by residence (urban versus rural/remote). Controlling for residence slightly narrowed the gap in PCI use, but did not fully explain the disparity in PCI rates between the two groups. Whether their residence was classified as rural/remote or urban, AMI patients from high-percentage First Nations identity areas still had significantly lower odds (18.7% and 17.3% lower odds; $p<0.05$) of receiving PCI than did patients from low-percentage Aboriginal identity areas (data not shown).

Discussion

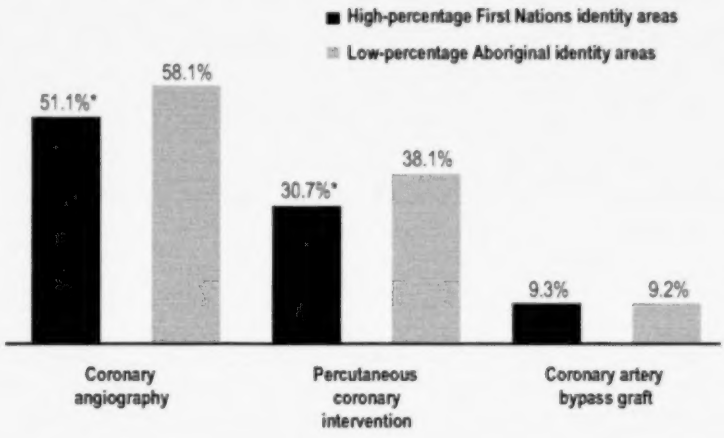
Similar to a previous report,[13] this study shows a higher AMI hospitalization event rate for residents of high-percentage First Nations identity areas, compared with residents of areas where the percentage reporting Aboriginal identity was lower. However, according to the present analysis, hospitalized AMI patients from high-percentage First Nations identity areas were less likely to undergo diagnostic (angiography) and revascularization procedures (in particular, PCI).

While this is the first Canadian study to demonstrate such differences in procedure use by Aboriginal identity, earlier research has shown that the use of cardiac procedures to treat AMI is often lower among more vulnerable populations.[22,25-31] For example, Rosvall et al. found an income gradient in five-year survival rates, with a higher risk of mortality among the lowest income groups.[32] But they also reported lower mortality risks among patients who received revascularization procedures, regardless of their income.

Treatment decisions, and consequently, rates of revascularization, are affected by patient age and sex, time since AMI onset, complexity of the AMI, and other health conditions.[18,19,22]

The lower rates of PCI among AMI patients from high-percentage First Nations identity areas persisted when the patient's sex, age, co-morbid conditions and residence were taken into account. This suggests that other factors may be contributing to the lower rates.

Figure 1
Age-standardized percentages of acute myocardial infarction (AMI) hospital patients who underwent cardiac procedures, by procedure and Aboriginal identity group in Dissemination Area, population aged 20 or older, Canada excluding Quebec, 2004/2005 to 2010/2011



* significantly different from low-percentage Aboriginal identity areas ($p<0.05$)
Note: Rates are based on pooled data (2004/2005 to 2010/2011) and standardized to age distribution of AMI patients from high-percentage First Nations identity areas.
Sources: 2004/2005 to 2010/2011 Discharge Abstract Database and National Ambulatory Care Reporting System, Canadian Institute for Health Information; 2004/2005 to 2009/2010 Alberta Ambulatory Care Database, Alberta Health and Wellness; 2006 Census, Statistics Canada.

Table 3
Age-standardized percentages of acute myocardial infarction (AMI) hospital patients with comorbid conditions at time of admission, by Aboriginal identity group in Dissemination Area, population aged 20 or older, Canada excluding Quebec, 2004/2005 to 2010/2011

Comorbid condition	High-percentage First Nations identity areas	Low-percentage Aboriginal identity areas
At least one	54.5*	46.1
Diabetes	39.3*	27.4
Heart failure	11.3	11.4
Cardiac dysrhythmia	6.2	6.8
Renal disease	4.6	5.1
Shock	1.9	1.7
Hypertension	3.8*	4.7
Chronic obstructive pulmonary disease	3.2	2.7
AMI in preceding year	6.6*	5.3

* significantly different from low-percentage Aboriginal identity areas ($p<0.05$)
Notes: Percentages are standardized to age distribution of patients from high-percentage First Nations identity areas. Results are based on six years of data to allow for calculation of "AMI in preceding year."
Sources: 2004/2005 to 2010/2011 Discharge Abstract Database, Canadian Institute for Health Information; 2006 Census, Statistics Canada.

What is already known on this subject?

- Deaths from acute myocardial infarction (AMI) are higher among First Nations people than among non-Aboriginal Canadians.
- Appropriate and timely health care after an AMI can reduce mortality and improve a survivor's quality of life.
- Hospital treatment focuses on restoring blood flow to the heart, often through revascularization: percutaneous coronary intervention (PCI) and coronary artery bypass grafting (CABG).
- Previous studies have reported that the use of such procedures to treat AMI is often lower among disadvantaged populations.
- The lack of ethnic identifiers on hospitalization records limits the information available on AMI hospitalizations and the use of cardiac procedures among hospitalized First Nations patients.

What does this study add?

- This analysis uses an area-based approach to identify AMI patients from high-percentage First Nations identity areas and from low-percentage Aboriginal identity areas.
- Residents of high-percentage First Nations identity areas were more likely to be hospitalized for AMI, and to do so earlier in life, but were less likely to undergo revascularization procedures, compared with residents of low-percentage Aboriginal identity areas.
- This difference in revascularization was largely driven by the relatively small share of patients from high-percentage First Nations areas who underwent PCIs.
- The pattern persisted when controlling for age, sex, rural/urban residence, and the patient's condition at admission.

Limitations and future research

Data availability issues limit the scope and generalizability of this study. Use of the "geozones" methodology as a proxy for identifying First Nations patients likely underestimates differences in AMI event rates and cardiac procedure use between First Nations people and others in Canada.[33]

Caution is warranted in generalizing findings of this study to all First Nations people. Hospitalization records from Quebec could not be included in the analysis. As well, the large numbers of First Nations people who live in urban areas are under-represented in this analysis, because few urban areas meet the geozones definition of a "high" concentration area—at least 33% of residents reporting Aboriginal identity.

This study was limited to acute care patients and a select number of treatment options. Little information is available about the diagnosis and management of coronary heart disease before hospital admission or after discharge. National information is not readily available on emergency department visits (the principal point of hospital admission for many AMI patients). Although medications are an important component of AMI treatment and management, data on pharmacotherapy at admission, during hospitalization, and after discharge are limited. Clinical guidelines suggest that initial treatments such as PCI are most effective when performed within the first two hours of the event for patients with ST-segment elevation myocardial infarction (STEMI).[20,21] However, this study was not able to identify patients diagnosed with that condition. The small sample sizes in high-percentage First Nations identity areas meant that the analysis could not adjust for the confounding relationship between socioeconomic status and Aboriginal identity.

Conclusions

Previous studies have shown higher AMI mortality rates among First Nations people than among non-Aboriginal Canadians.[2] The lack of ethnic identifiers on national hospitalization records limits the information available on AMI hospitalizations and the use of cardiac procedures among First Nations patients. Using an area-based approach and hospital discharge records from CIHI, this study shows that residents of high-percentage First Nations identity areas were more likely to be admitted to acute care hospitals for AMI, and to do so earlier in life, but were less likely to undergo coronary angiography and revascularization procedures, compared with residents of low-percentage Aboriginal identity areas. This pattern persisted when controlling for age, sex, rural/urban residence and the patient's condition at admission.

Future research could explore the timeliness of access to AMI care, with specific attention to associations between travel times and hospital transfers and outcomes for patients from high-percentage First Nations identity areas. An examination of outcomes of hospital care, such as in-hospital mortality rates and readmission rates, could demonstrate relationships with hospital treatments and availability of community care after discharge. ■

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Appendix A

International Classification of Diseases (ICD-10) codes

- Acute myocardial infarction (AMI): I21, I22
- Shock (mainly cardiogenic and hypovolaemic shock): R57
- Heart failure: I50
- Acute lung edema: J81
- Cardiac dysrhythmia: I47-I49
- Diabetes mellitus: E100-E109, E110-E119, E130-E139, E140-E149
- Renal disease: N17-N19, R34, I12, I13
- Cancer: C00-C26, C30-C44, C45-C97, Z510, Z511
- Chronic obstructive pulmonary disease: J41-J44, J47
- Hypertension: I11, I100, I101
- Peripheral vascular disease (PVD): I70,I739
- Cerebral vascular disease: I60-I67, I69, G450-G452, G454, G458, G459

Canadian Classification of Interventions (CCI) procedure codes

- Coronary angiography: 3.IP.10.VX
- Percutaneous coronary intervention (PCI): 1. IJ.50, 1.IJ.57.GQ, 1.IJ.54.GQ-AZ
- Coronary artery bypass grafting (CABG): 1. IJ.76